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DATE : 15 JANUARY 1970

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INFO:

PAGE 1 OF 16

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TO NFO

CITE 7815

CORONA

REF A: 860

REF B: 934

SUBJECT: MISSION 1108, PHOTOGRAPHIC EVALUATION INTERIM REPORT (PEIR)

1. NUMERICAL SUMMARY:

MISSION NO & DATES: 1108-1, 4 DECEMBER - 11 DECEMBER 1969

RECOVERY 11 DECEMBER 1969/2355Z

1108-2, 11 DECEMBER - 21 DECEMBER 1969

RECOVERY 21 DECEMBER 1969/2130Z

LAUNCH DATE & TIME: 4 DECEMBER 1969/2138Z

VEHICLE NO: 1655

CAMERA SYSTEM: CR-9

PAN CAMERAS: AFT LOOKING 316, FILM TYPE 3404, SO-242

FWD LOOKING 317, FILM TYPE 3404

DISIC UNIT: 012

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 2 OF 16

TO

INFO

CITE

STELLAR LENS: PORT F/2.8, 1.5 SEC, NO FILTER
STARBOARD F/2.8, 1.5 SEC, NO FILTER
FILM TYPE: 3401

TERRAIN LENS: F/6.3, 1/500 SEC, W/12 FILTER
FILM TYPE: 3400

RECOVERY REVS: MISSION 1108-1, REV 115
MISSION 1108-2, REV 276

LAUNCH WINDOW: 2130Z TO 2225Z

2. CAMERA SETTINGS:

FWD LOOKING: WRATTEN W/25 (PRIMARY)
WRATTEN W/25 (ALTERNATE)
SLIT WIDTH POS 1 - 0.141 INCHES (MEASURED)
POS 2 - 0.214 INCHES (MEASURED)
POS 3 - 0.274 INCHES (MEASURED)
POS 4 - 0.334 INCHES (MEASURED)
FAIL SAFE - 0.237 INCHES (MEASURED)

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 3 OF 16

TO

INFO

CITE

AFT LOOKING:

WRATTEN W/21 (PRIMARY)

WRATTEN W/2B (ALTERNATE)

SLIT WIDTH POS 1 - 0.084 INCHES (MEASURED)

POS 2 - 0.140 INCHES (MEASURED)

POS 3 - 0.185 INCHES (MEASURED)

POS 4 - 0.289 INCHES (MEASURED)

FAIL SAFE - 0.154 INCHES (MEASURED)

3. PERFORMANCE SUMMARY: REPORTED THE PI SUITABILITY OF

MISSION 1108 RANGED FROM FAIR TO GOOD AND THAT THE REDUCTION IN SCALE
BECAUSE OF HIGHER THAN NORMAL MISSION ALTITUDE(AFTER PASS D40) REDUCED
THE EFFECTIVENESS OF THE MISSION. A SCALE COMPARISON WAS MADE BY
MEMBERS OF THE PET FOR ALTITUDES OF 80, 90 AND 100 MILES AND THE
EFFECTS OF A 10 PERCENT ALTITUDE CHANGE COULD EASILY BE DISTINGUISHED.
ALTHOUGH BOTH THE 1108-1 AND 1108-2 MIP FRAMES WERE SELECTED FROM THE
FORWARD LOOKING CAMERA, THE GENERAL IMAGE QUALITY OF THE FORWARD LOOKING
CAMERA IS POORER THAN THAT OF THE AFT LOOKING CAMERA.

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 4 OF 16

TO

INFO

CITE

SMEARED IMAGES ON THE FORWARD CAMERA ARE DETECTABLE WHERE THE WIDER EXPOSURE SLITS WERE REQUIRED. THIS SMEARING IS MOST NOTICEABLE ON THE TAKE-UP SIDE OF THE FORMAT. THE LARGEST UN-COMPENSATED MOTION EXISTS ON THE TAKE-UP SIDE OF THE FORWARD CAMERA. WHERE ILLUMINATION LEVEL PERMITTED USING NARROW SLITS, THE SMEARING AFFECT IS NOT READILY OBSERVABLE IN THE IMAGERY.

THE MIP OF 105 FOR MISSION 1108-1 WAS ACHIEVED AT AN ALTITUDE OF 82 NM WITH AN MIP OF 100 ACHIEVED IN MISSION 1108-2 FROM AN ALTITUDE OF 100 NM. THESE MIPS ARE THE HIGHEST ACHIEVED BY A CORONA SYSTEM FOR A LAUNCH NEAR THE WINTER SOLSTICE. NO CORN TARGETS WERE ACQUIRED FOR EVALUATION ON MISSION 1108.

THE PET FELT THAT THE INFLIGHT PERFORMANCE OF THE AFT CAMERA WAS EXTREMELY GOOD WHEN CONSIDERING LABORATORY PERFORMANCE, ALTITUDE AND TIME OF YEAR. THE FORWARD CAMERA HOWEVER, WAS NOT PERFORMING TO PEAK POTENTIAL THROUGHOUT MOST OF THE MISSION.

4. PAN CAMERA ANOMALIES

A. ANOMALY - APPROXIMATELY 35 PERCENT OF THE DATA BITS ON

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 5 OF 16

TO

INFO

CITE

THE AFT LOOKING CAMERA ARE BLOOMED WITH EACH DATA BLOCK
EXPOSURE THROUGHOUT THE MISSION.

CAUSE - DURING READINESS TESTING AT THIS BLOOMED CONDITION
WAS NOTED. MICRO-DENSITOMETER TRACES OF THESE BLOOMED BITS
INDICATED THEY WERE WITHIN THE DENSITY AND SIZE SPECIFICATIONS
AND THEREFORE ACCEPTABLE. THE BITS VARY IN SIZE FROM APPROXI-
MATELY 8 TO 10.3 MILS. THIS IS A GREATER VARIATION THAN PREVIOUS
MISSIONS, BUT PROBABLY COULD HAVE BEEN USED SUCCESSFULLY IF
REQUIRED.

NO COPY OF THE FILM WAS MADE FOR DATA BLOCK READING SINCE THE
TAPE RECORDER DATA PROVIDES THE PRIMARY SOURCE OF TIME CORRELATION
ON THE CORONA SYSTEM. THE DATA BLOCK IS USED ONLY IF A TAPE
RECORDER FAILURE OCCURS. NO ACTION ITEM IS ASSIGNED.

B. ANOMALY - ON INSTRUMENT 316 A HEAVY, DIAGONAL CREASE WITH
ASSOCIATED EMULSION LIFTS AND PLUS DENSITY MARKINGS EXTENDS APPROXI-
MATELY 15 INCHES WITHIN THE FORMAT ON FRAME 47 OF PASS D199. IMAGERY
IN THE AREA OF THE CREASE INDICATES THIS ANOMALY OCCURRED AFTER

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 6 OF 16

TO

INFO

CITE

PHOTOGRAPHIC SCAN.

CAUSE - THE CREASE OCCURRED DURING DEFILMING AND PRESPLICE

OPERATION AT EK. NO SPECIFIC ACTION IS ASSIGNED.

C. ANOMALY - ON INSTRUMENT 317 A FOG PATTERN IS PRESENT
ON THE FOURTH FRAME FROM THE END OF ALL CAMERA OPERATIONS. THE
DENSITY OF THIS FOG PATTERN IS COMMENSURATE WITH CAMERA SIT
PERIODS; AFTER A THREE REV SOAK, FOG DENSITY IN THE ORIGINAL
NEGATIVE MEASURED 1.1 ABOVE THE BASE LEVEL.

CAUSE - THIS LIGHT LEAK APPEARS TO ORIGINATE IN THE DRUM OF
INSTRUMENT 317 AND IS IMAGED ON THE MATERIAL AT THE INSTRUMENT
EXIT ROLLER. NO SPECIFIC ACTION IS ASSIGNED.

D. ANOMALY - AN EXTRA PORT HORIZON IMAGE IS PRESENT WITH
FRAME 35 OF PASS D95. THE EXTRA HORIZON IMAGE IS OVERLAPPED TO
A SMALL EXTENT WITH THE STARBOARD HORIZON IMAGE ASSOCIATED WITH
FRAME 34 OF PASS D95. NO FIDUCIALS ARE ASSOCIATED WITH THIS
EXTRA HORIZON.

CAUSE - THE HORIZON CAMERA SHUTTERS FOR EACH MAIN INSTRUMENT ARE

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 7 OF 16

TO

INFO

CITE

ACTUATED BY ROTARY SOLENOIDS CONNECTED IN PARALLEL THROUGH A DUAL CONTACT RELAY. THESE SOLENOIDS RECEIVE THEIR 24V UN-REGULATED POWER THROUGH THE CENTER OF FORMAT SWITCH IN SERIES WITH THE HALF REV CAM SWITCH, AS WELL AS THROUGH ONE SET OF CONTACTS ON THE RELAY. THE OTHER SET OF CONTACTS PROVIDES POWER TO THE HORIZON CAMERA FIDUCIAL LAMPS. A REVIEW OF THE ASSOCIATED CIRCUITRY INDICATES THAT THIS ANOMALY COULD NOT HAVE OCCURRED. ALL HORIZON CAMERA SHUTTER OPERATIONS, PRECEDING AND FOLLOWING THIS ANOMALY, WERE NORMAL. THE MINOR OVERLAP CONDITION OF THIS EXTRA HORIZON IMAGE DOES NOT INTERFERE WITH NORMAL HORIZON ARC MEASUREMENTS AND NO SPECIFIC ACTION IS ASSIGNED.

E. ANOMALY - A MINUS DENSITY LINE WITH PARALLEL PLUS DENSITY BANDS APPEARS INTERMITTENTLY THROUGHOUT BOTH FORWARD AND AFT RECORDS OF BOTH PARTS OF THE MISSION. THESE BANDS ARE GENERALLY AT A SLIGHT BIAS REFERENCED TO THE FILM WIDTH. THE BANDS SOMETIMES HAVE A BROWNISH APPEARANCE.

CAUSE - THIS APPEARS TO BE ASSOCIATED WITH FILM MANUFACTURING.

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INFO :

PAGE 8 OF 16

| | | | |
|---------|----------|--------------------------|----------|
| ROUTING | DEFERRED | PRIORITY | INITIALS |
| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

TO

INFO

CITE

ACTION ITEM 1108-1: CONFIRM WHETHER THIS BAND WAS CAUSED
IN FILM MANUFACTURING. MONITOR

F. ANOMALY - NUMEROUS COMET-SHAPED MINUS DENSITY SPOTS
ARE PRESENT INTERMITTENTLY THROUGHOUT THE FORWARD RECORD OF
THE FIRST PART OF THE MISSION.

CAUSE - BECAUSE HEAD/TAIL ORIENTATION OF THE COMETS REVERSE
BETWEEN MANUFACTURING SPLICES, WE CONCLUDE THAT THIS OCCURRED
IN FILM MANUFACTURING. NO ACTION ITEM IS INDICATED.

G. ANOMALY - INSTANCES OF SEVERE OUT OF FOCUS IMAGERY ARE
APPARENT ON FRAMES THREE AND FOUR OF MOST PASSES OF INSTRUMENT
317. THE AREA IS APPROXIMATELY TEN INCHES FROM THE TAKE-UP END
OF THE FRAME. THE AMOUNT OF IMAGE DEGRADATION IS DIRECTLY
ASSOCIATED WITH LENGTH OF SIT TIME BETWEEN PASSES. ON PASSES
WITH SIT TIMES OF ONE REV, THE OUT OF FOCUS IMAGERY IS LESS SEVERE
AND IS DIFFICULT TO DETECT. AT LEAST TWO REVS BETWEEN OPERATES
ARE NECESSARY FOR CONSISTENT DETECTION.

CAUSE - THE MARKS ARE DIRECTLY ASSOCIATED WITH THE SMALL DIAMETER.

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CLASSIFIED MESSAGE

TOP SECRET

ORIG :
UNIT :
EXT :
DATE :

TO :
FROM :
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INFO :

PAGE 9 OF 16

| ROUTING | | | |
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TO

INFO

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ROLLER IN THE EXTENDED FILM PATH ASSEMBLY AND THE SMALL DIAMETER (BOBBLER) ROLLER IN THE CONSTANT TENSION ASSEMBLY. EXTENDED INOPERATIVE PERIODS TEND TO IMPRESS THESE ROLLERS INTO THE PAYLOAD CAUSING THE MATERIAL TO BE DEFORMED. THIS DEFORMATION IS RETAINED DURING THE PHOTOGRAPHIC SCAN RESULTING IN OUT OF FOCUS IMAGERY OF THESE POINTS. NO SEPARATE ACTION OTHER THAN THE CONTINUING WORK ON IMPROVING FILM FLATNESS IS INDICATED.

H. ANOMALY - THE MALFUNCTION OF THE SLOPE PROGRAMMER WAS NOT DISCUSSED AT THE PET SINCE NO PHOTOGRAPHIC PASSES WERE AFFECTED. THE FAILURE OF THE SWITCH PROGRAMMER WAS ADDRESSED BUT NO EXPOSURE PROBLEMS WERE NOTED ON THE DOMESTIC ORIGINAL NEGATIVE, WHICH WERE AVAILABLE.

I. THE REMAINING ANOMALIES NOTED IN THE 31 MESSAGE WERE CONSIDERED CHARACTERISTIC OF THE SYSTEM AND ALTHOUGH REVIEWED BY THE PET ARE NOT DISCUSSED HEREIN.

5. DISIC CAMERA PERFORMANCE: THE LAST ACQUISITION OBTAINED FROM
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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 10 OF 16

TO

INFO

CITE

THE INDEX CAMERA WAS FRAME 59 OF PASS 204. THE LAST STELLAR
ACQUISITION WAS FRAME 41 OF PASS 204.

THE LAST 150 FEET OF MISSION 1108-2 MATERIAL WAS NOT EXPOSED
DUE TO A SYSTEM FAILURE.

POINT-TYPE STAR IMAGES WERE RECORDED IN BOTH STELLAR CAMERAS,
BUT FEWER STARS WERE RECORDED ON THIS MISSION THAN ON PREVIOUS
MISSIONS. AUTOMATIC STELLAR SOLAR SENSORS WERE NOT ACTIVATED DURING
THIS MISSION.

THE INDEX PHOTOGRAPHY IS GOOD AND COMPARES FAVORABLY WITH PREVIOUS
MISSIONS.

THE DENSITY OF THE INDEX RECORD VARIED FROM LIGHT TO HEAVY, WITH
MOST OF THE MISSION MEDIUM HEAVY. THE INDEX SHUTTER SPEED WAS FIXED
AT THE MAXIMUM SPEED (1/500) FOR THE DISIC SYSTEM, THEREFORE THE FORMAT
DENSITY CANNOT BE DECREASED BY INCREASING SHUTTER SPEED. IT IS NOTED
THAT MANY OF THE HEAVY DENSITY FRAMES WERE EXPOSED OVER ICE AND SNOW.
THE PET RECOMMENDS THAT ☐ INVESTIGATE AN ALTERNATE METHOD FOR PROCESSING
THE INDEX FILM TO ACCOMMODATE THE WIDE EXPOSURE RANGE ENCOUNTERED IN THE

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CLASSIFIED MESSAGE

TOP SECRET

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INFO : PAGE 11 OF 16

ROUTING

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TO

INFO

CITE

THE TERRAIN RECORD (ACTION ITEM 1108-2)

6. DISIC ANOMALIES:

A. ANOMALY - THE DISIC CAMERA FAILED TO OPERATE AFTER
FRAME 73 OF PASS 204.

CAUSE - BASED UPON THE AVAILABLE T/M DATA, THE CAUSE OF THIS
ANOMALY WAS THE FAILURE OF A COMPONENT IN THE INVERTER. LONGER
THAN NORMAL CYCLE TIMES WERE NOTED ON PASS 1 AND BECAME PROGRESSIVELY
LONGER UNTIL FAILURE WAS EXPERIENCED. THE CYCLE RATE DATA FROM
THE HIVOS TEST IS 9.376 SEC/CYCLE. THE RATE TAKEN FROM PREFLIGHT
SLP DATA IS 9.391 SEC/CYCLE. THE RATE TAKEN FROM SLP DATA DURING
THE LAST 5 RECOVERED FRAMES IS 9.451 SEC/CYCLE. A SUDDEN REDUCTION
IN MOTOR VOLTAGE AS INDICATED BY THE MOTOR VOLTAGE T/M MONITOR,
FROM 3.5 TO 2.0 VOLTS ALSO OCCURRED AT FAILURE. SIGNIFICANCE OF
T/M DATA: LONGER THAN NORMAL CYCLE TIME CAN RESULT FROM: (1)
EXCESSIVE FRICTION LOAD; (2) INCORRECT FREQUENCY OF DC/AC INVERTER
OUTPUT VOLTAGE; (3) REDUCED MOTOR TORQUE RESULTING FROM ERRATIC
DC/AC INVERTER OPERATION. SUDDEN REDUCTION IN OUTPUT VOLTAGE WITHOUT

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 12 OF 16

TO

INFO

CITE

FURTHER DEGRADATION INDICATES AN OPEN CURCUIT ON ONE SIDE
OF THE PUSH-PULL INVERTER DRIVE.

(1) TESTS HAVE PROVEN THAT EXCESSIVE FRICTION LOADING
DOES NOT INCREASE STRESS ON DC/AC INVERTER COMPONENTS,
THEREFORE, IF SUCH A CONDITION EXISTED, IT WOULD NOT HAVE
RESULTED IN THE EVENTUAL FAILURE OF THE INVERTER.

(2) HAD INVERTER FREQUENCY SUFFERED A SIMPLE FREQUENCY
SHIFT THE SYSTEM WOULD CONTINUE TO OPERATE WITH VARYING CYCLE
RATE BUT SUCH VARIATION WOULD NOT ACCOUNT FOR THE REDUCTION
IN MOTOR VOLTAGE AT FAILURE.

(3) ERRATIC FREQUENCY CHANGES OF THIS NATURE WHICH CAUSE
"BREAK UP" OF THE INVERTER OUTPUT VOLTAGE CAN CAUSE BOTH LOSS
OF MOTOR SYNCHRONOUS OPERATION AND FINAL DESTRUCTION OF ONE
SIDE OF THE PUSH-PULL OUTPUT DRIVERS DUE TO EXCESSIVE SWITCHING
OVER DISSIPATION.

A NUMBER OF INDIVIDUAL COMPONENT FAILURES IN THE INVERTER COULD
CAUSE ERRATIC OUTPUT. INASMUCH AS NO INVERTER INTERNAL T/M IS

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| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 13 OF 16

TO

INFO

CITE

AVAILABLE, IT IS IMPOSSIBLE TO PINPOINT WHICH CIRCUIT OR
COMPONENT IS RESPONSIBLE. IT IS THEREFORE CONCLUDED THAT
AN INVERTER COMPONENT FAILURE OCCURRED.

ACTION ITEM 1108-2 - (1) IT IS RECOMMENDED THAT AN INVERTER BE
SUBJECTED TO AN ENVIRONMENTAL TYPE TEST TO DETERMINE IF ENVIRONMENTAL
CONDITIONS WERE RESPONSIBLE FOR THE EVENTUAL INVERTER FAILURE.
CHANGES, IF ANY TO THE INVERTER, WOULD BE MADE BASED ON THE RESULTS
OF THIS TESTING.

TEST PROCEDURE

(2) CHANGE DISIC FLIGHT PREP/ Δ TO INCLUDE MEASUREMENT OF CYCLE
RATE AND OUTPUT OF INVERTER PUSH-PULL CURCUIT.

B. ANOMALY - MINOR DENDRITIC, WAVERING PLUS DENSITY STATIC
TRACES AND GRID PLATE STATIC DISCHARGE IN THE PORT FORMAT ARE
PRESENT THROUGHOUT THE STELLAR FILM.

CAUSE - THESE MARKS ARE CHARACTERISTIC OF THIS SYSTEM IN SOME
PRESSURE AREAS. SEVERITY IS MINOR. SOME CORRELATION BETWEEN
MARKING AND PMU OFF WAS NOTED. NO ACTION INDICATED.

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CLASSIFIED MESSAGE

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| ROUTING | DEFERRED | PRIORITY | INITIALS |
| | ROUTINE | OPERATIONAL IMMEDIATE | INITIALS |

PAGE 14 OF 16

TO

INFO

CITE

C. ANOMALY - A PLUS DENSITY FLARE-TYPE MARK IS PRESENT
IN SOME OF THE STARBOARD FORMATS FROM BOTH MISSION SEGMENTS.
THE MARK AFFECTS APPROXIMATELY 8 PERCENT OF THE ACTIVE FORMAT
AREA. STAR IMAGERY IS PRESENT WITHIN THE FLARE MARKED AREA.
CAUSE - A MINOR SUNLIGHT REFLECTION DURING SOME OPERATIONS IS
CONSIDERED THE CAUSE. NO CORRECTIVE ACTION IS WARRANTED. THIS
TYPE MARKING HAS NOT BEEN OBSERVED ON PREVIOUS SYSTEMS.

D. ANOMALY - SPOT-TYPE PLUS DENSITY DISCHARGES ARE PRESENT
ON THE INDEX FILM ON SEVERAL OPERATIONS OF PASSES 106 THRU 118.
CAUSE - THESE SPOT-TYPE STATIC DISCHARGES ARE OF THE SAME
CHARACTER AND TYPE THAT APPEARED ON MISSION 1107-2 FILM. SEVERITY
IS MINOR. NO ACTION IS INDICATED.

E. ANOMALY - MINOR DENDRITIC AND WAVERING PLUS DENSITY DIS-
CHARGES ARE PRESENT ON THE INDEX FILM.
CAUSE - THESE MARKS ARE CHARACTERISTIC OF THIS SYSTEM IN SOME
PRESSURE AREAS. SEVERITY IS MINOR. NO ACTION IS INDICATED.

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PAGE 15 OF 16

TO

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7. COMMENTS:

A. MISSION 1108-2 RETURNED 213 FRAMES OF AERIAL COLOR FILM, S0-242, AT THE END OF THE AFT CAMERA SUPPLY. EARLY EVALUATIONS OF THE COLOR MATERIAL FROM THIS MISSION WERE CONDUCTED FROM THE COLOR DUPES AND THE RESULTING COMMENTS WERE GENERALLY NEGATIVE. THE PHOTOINTERPRETERS REPORTED THE PI SUITABILITY OF THE COLOR RECORD AS POOR FOR FIRST PHASE EVALUATIONS BECAUSE OF THE SMALL SCALE AND LOWER RESOLUTION LEVELS. THE PET FELT THAT THE BEST IMAGE QUALITY AND COLOR BALANCE OF THE ORIGINAL S0-242 ARE GOOD, BUT NOTED THAT THERE IS A SIGNIFICANT RESOLUTION LOSS FROM THE ORIGINAL TO THE DUPLICATES. MUCH OF THE S0-242 PHOTOGRAPHY APPEARED TO BE DEGRADED BY HAZE, PARTICULARLY AT THE LOW SOLAR ALTITUDES (LESS THAN 15 DEGREES). THE BEST COLOR IMAGE QUALITY WAS TAKEN AT THE HIGHER SOLAR ALTITUDES (40 DEGREES). THIS COLOR PHOTOGRAPHY IS BETTER THAN ANY OTHER COLOR PHOTOGRAPHY OBTAINED TO DATE FROM THE CORONA SYSTEM, EVEN THOUGH THIS FLIGHT WAS FLOWN AT 15 PERCENT HIGHER ALTITUDE.

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PAGE 16 OF 16

TO

INFO

CITE

PARTICULARLY NOTABLE WAS THE FINER DYE STRUCTURE OF THE
S0-242 MATERIAL WHEN COMPARED WITH S0-121. ELECTROSTATIC
FOGGING DOES NOT APPEAR TO BE A PROBLEM WITH S0-242 IN THE
CORONA SYSTEM.

END OF MESSAGE

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